Copper-to-Fiber Media Converters

with IP- Less™ Remote Management

Overview

Once confined to the LAN or campus environment, Ethernet has been adopted into the growing modern optical infrastructure. It now covers everything from the core of the MAN to the last mile access networks for FTTH (home), FTTS (subscriber), and FTTB (business). Simplicity, scalability, and wide availability of interoperable equipment makes Ethernet a poplular choice for providing seamless end-to-end optical connectivity. Wide acceptance and growing demand reinforces optical Ethernet (OE) as the most cost-effective network infrastructure to deploy and maintain.

The Fiber Driver Copper-to-Fiber Media Converter family matches copper Ethernet and Fast Ethernet media to a range of single-mode, multi-mode, and single fiber optical media environments. The EM316ERM modules connect to 10 Mbps Ethernet devices. The EM316FRM modules connect to 100 Mbps Fast Ethernet devices. The EM316EFRM modules use speed auto-negotiation and automatic MDI/MDI-X detection to match duplex mode connections to either Ethernet or Fast Ethernet (10/100 Mbps) devices.

At the heart of the IP-Less™ technology, the onboard "Micro Agent" processor separates the management channel from the data channel. Used in pairs, the media converter modules transmit a logically separate (out of band) management channel that shares the same physical fiber path as the data channel. This channel separation ensures full data bandwidth availability while providing complete Fiber Driver management support including security and immunity from data channel condition variances.

The copper-to-fiber media converter family features a standard RJ-45 Ethernet port. The EM316EFRM module includes auto-negotiation and MDI/MDI-X duplex detection as well as manual configuration. Duplex detection allows use of either straight-through or crossover cables for Ethernet connection to an external device.

Highlights

- Media Conversion from copper to single-mode or multi-mode fiber
  - Copper 10Base-T Ethernet to fiber (EM316ERM)
  - Copper 100Base-TX Ethernet to fiber (EM316FRM)
  - Copper 10/100Base-TX Ethernet to fiber (EM316EFRM)
- Secure IP-Less™ remote link management
- Extra long range links
  - Beyond 100 kilometers on single-mode
  - Up to 2 kilometers on multi-mode
- Manual configuration and auto-negotiation for speed (EM316EFRM)
- Manual configuration and detection support for MDI/MDI-X duplex mode (EM316EFRM)
- 802.3u device compatibility
- Link Integrity Notification (LIN) for end-to-end link state propagation
- Last Gasp power loss event alerts
- Remote loopback for trunk link integrity validation
- Reflection detection to identify connector type mismatches
- Fiber Driver chassis compatiblity with hot-swap support

Key Benefits

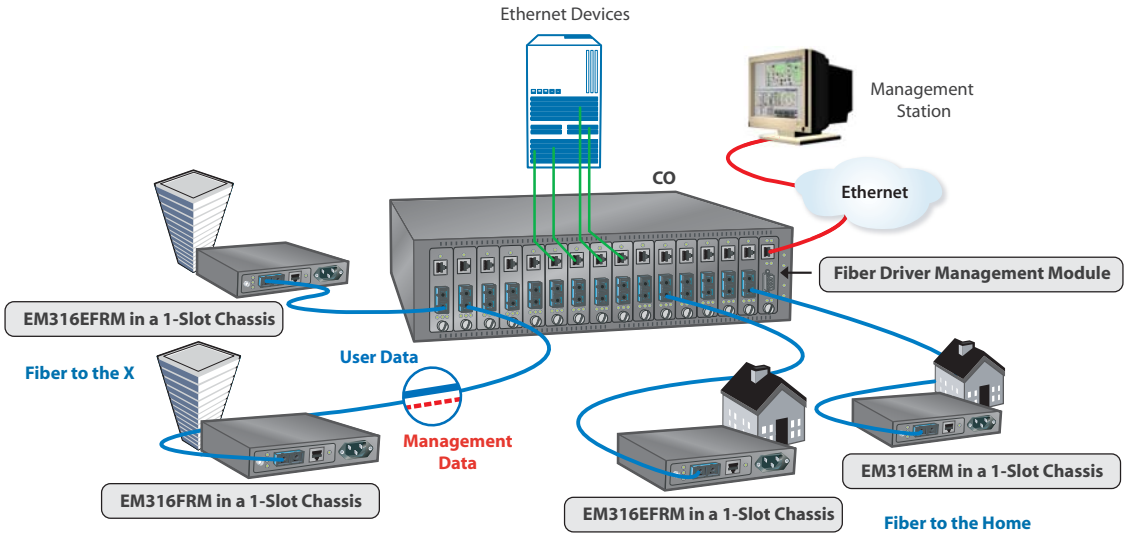
- Cost Saving
  - No management module at remote sites
  - Single physical fiber link for data and management
- Management simplicity and security without loss of data bandwidth
  - Single fiber with separate data and management channels
  - No data bandwidth loss from management communications
  - No interference of management from data channel conditions
  - Single IP address for full circuit management
- No worries about signal reflection

Other significant module features include Link Integrity Notification (LIN), remote loopback, and Last Gasp alerts. LIN causes loss of link at any port of one module to disable the other ports of the modules at each end of the affected OE link to correctly propagate link status to dependent network devices even at the functional end of a failed link. Remote loopback adds to local loopback by verifying the integrity of the entire link. Last Gasp notification sends a management alert before the module shuts down in the event of power loss.

Without innovative MRV technology, these module features would involve expensive network devices and techniques including management hardware supporting IP/SNMP at each end of the link and inconvenient multiple IP address assignments. To deal with compromised data channel bandwidth and management security, other options might include a VLAN or installation of duplicate fibers and equipment. Fiber Driver IP-Less™ media converters are a simpler, cost-effective, and powerful alternative to traditional IP/SNMP solutions for remote optical Ethernet link management.

Fiber Driver media converters with remote management are available for multi-mode as well as single-mode fiber configurations. Multi-mode modules can span links up to 2 kilometers and single-mode modules can extend beyond 100 kilometers. Single fiber models combine transmit and receive signals onto the same fiber to reduce the cost even further for links beyond 100 kilometers.

Contact a nearby authorized MRV Communications representative or visit the MRV website at http://www.mrv.com for additional information including prices and availability.



Physical Specifications

Operating Temperature Range	0°C to 50°C (32°F to 122°F)
Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Relative Humidity	85% maximum, non-condensing
Physical Dimensions	25 mm x 75 mm x 175 mm deep (1" x 3" x 7" deep)
Weight	120-240 g (4.2 - 8.5 oz) depending on configuration
Regulatory Compliance	FCC Part 15 (Class A); IC (Class A); EMC Directive: Emission (Class A) and Immunity; RoHS Directive; China RoHS; WEEE Directive

EM316EFRM

DUAL FIBER

Ordering Information

Model	Function	Protocol Copper/Fiber	Connectors[1] Copper/Fiber	Wavelength (nm)	Budget[2] (dB)	Range[3] (Copper) (m)	Range[3] (Fiber) (km)
EM316EFRM/M	10/100Base-TX Ethernet to 100Base-FX MM Dual Fiber with IP-Less Remote Management	10/100Base-TX/ Proprietary[4]	RJ-45/DSC	1310	7	1-100	0 - 2
EM316EFRM/S1	10/100Base-TX Ethernet to 100Base-FX SM Dual Fiber with IP-Less Remote Management	10/100Base-TX/ Proprietary[4]	RJ-45/DSC	1310	17	1-100	0 - 35
EM316EFRM/S2	10/100Base-TX Ethernet to 100Base-FX SM Dual Fiber with IP-Less Remote Management	10/100Base-TX/ Proprietary[4]	RJ-45/DSC	1310	24	1-100	25 - 45
EM316EFRM/S3	10/100Base-TX Ethernet to 100Base-FX SM Dual Fiber with IP-Less Remote Management	10/100Base-TX/ Proprietary[4]	RJ-45/DSC	1550	24	1-100	35 - 90

DUAL WAVELENGTH SINGLE FIBER (Sold in pairs only)

Ordering Information

Model	Function	Protocol Copper/Fiber	Connectors[1] Copper/Fiber	Tx/Rx Wavelength (nm)	Budget[2] (dB)	Range[3] (Copper) (m)	Range[3] (Fiber) (km)
EM316WEFRMC/S2	10/100Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management	10/100Base-TX/ Proprietary[4]	RJ-45/SC	1310/1550	17 (@ 1310 nm)	1 - 100	0 - 30
EM316WEFRMT/S2				1550/1310			
EM316WEFRMC/S3	10/100Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management	10/100Base-TX/ Proprietary[4]	RJ-45/SC	1310/1550	22 (@1310 nm)	1 - 100	0 - 45
EM316WEFRMT/S3				1550/1310			
EM316WEFRMC/EZX	10/100Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management	10/100Base-TX/ Proprietary[4]	RJ-45/SC	1550/1590	32 (@1550 nm)	1 - 100	30 - 130
EM316WEFRMT/EZX				1590/1550			
EM316WEFRMCS2JR	10/100Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management *(Reversed Tx/Rx wavelength for compatibility with pre-RoHS models)*	10/100Base-TX/ Proprietary[4]	RJ-45/SC	1550/1310	17 (@1310 nm)	1 - 100	0 - 30
EM316WEFRMTS2JR				1310/1550			
EM316WEFRMCS3JR	10/100Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management *(Reversed Tx/Rx wavelength for compatibility with pre-RoHS models)*	10/100Base-TX/ Proprietary[4]	RJ-45/SC	1550/1310	22 (@1310 nm)	1 - 100	0 - 45
EM316WEFRMTS3JR				1310/1550			
EM316WEFRMCEZXJ	10/100Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management	10/100Base-TX/ Proprietary[4]	RJ-45/SC	1550/1590	NA/32 (@1550 nm)	1 - 100	30 - 130
EM316WEFRMTEZXJ				1590/1550			

[1] Default connectors listed, others optional.
[2] Higher budgets available.
[3] Distances are approximate and assume 9µ SM and 62.5µ MM.
[4] 125Mbps

EM316ERM

DUAL FIBER

Ordering Information

Model	Function	Protocol Copper/Fiber	Connectors[1] Copper/Fiber	Wavelength (nm)	Budget[2] (dB)	Range[3] (Copper) (m)	Range[3] (Fiber) (km)
EM316ERM/M	10Base-TX to 100Base-FX MM with IP-Less Remote Management	10Base-T/ Proprietary[4]	RJ-45/DSC	1310	7	1-100	0 - 2
EM316ERM/MX	10Base-TX to 100Base-FX MM with IP-Less Remote Management	10Base-T/ Proprietary[4]	RJ-45/DSC	1310	19	1-100	2 - 8
EM316ERM/S1	10Base-TX to 100Base-FX SM with IP-Less Remote Management	10Base-T/ Proprietary[4]	RJ-45/DSC	1310	17	1-100	0 - 35
EM316ERM/S2	10Base-TX to 100Base-FX SM with IP-Less Remote Management	10Base-T/ Proprietary[4]	RJ-45/DSC	1310	24	1-100	25 - 45
EM316ERM/S3	10Base-TX to 100Base-FX SM with IP-Less Remote Management	10Base-T/ Proprietary[4]	RJ-45/DSC	1550	24	1-100	35 - 90

DUAL WAVELENGTH SINGLE FIBER (Sold in pairs only)

Ordering Information

Model	Function	Protocol Copper/Fiber	Connectors[1] Copper/Fiber	Tx/Rx Wavelength (nm)	Budget[2] (dB)	Range[3] (Copper) (m)	Range[3] (Fiber) (km)
EM316WERMC/S2	10Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management	10Base-T/ Proprietary[4]	RJ-45/SC	1310/1550	17 (@1310 nm)	1-100	0 - 30
EM316WERMT/S2				1550/1310			
EM316WERMC/S3	10Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management	10Base-T/ Proprietary[4]	RJ-45/SC	1310/1550	22 (@1310 nm)	1-100	0 - 45
EM316WERMT/S3				1550/1310			
EM316WERMC/S2JR	10Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management *(Reversed Tx/Rx wavelength for compatibility with pre-RoHS models)*	10Base-T/ Proprietary[4]	RJ-45/SC	1550/1310	17 (@1310 nm)	1-100	0 - 30
EM316WERMT/S2JR				1310/1550			
EM316WERMC/S3JR	10Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management *(Reversed Tx/Rx wavelength for compatibility with pre-RoHS models)*	10Base-T/ Proprietary[4]	RJ-45/SC	1550/1310	22 (@1310 nm)	1-100	0 - 45
EM316WERMT/S3JR				1310/1550			
EM316WERMCEZXJR	10Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management	10Base-T/ Proprietary[4]	RJ-45/SC	1550/1590	32 (@1310 nm)	1-100	30 - 130
EM316WERMTEZXJR				1590/1550			

[1] Default connectors listed, others optional.
[2] Higher budgets available.
[3] Distances are approximate and assume 9µ SM and 62.5µ MM.
[4] 125Mbps

EM316FRM

DUAL FIBER

Ordering Information

Model	Function	Protocol Copper/Fiber	Connectors[1] Copper/Fiber	Wavelength (nm)	Budget[2] (dB)	Range[3] (Copper) (m)	Range[3] (Fiber) (km)
EM316FRM/M	100Base-TX to 100Base-FX MM with IPLess Remote Management	Fast Ethernet/ Proprietary	RJ-45/DSC	1310	7	1 - 100	0 - 2
EM316FRM/S1	100Base-TX to 100Base-FX SM with IPLess Remote Management	Fast Ethernet/ Proprietary	RJ-45/DSC	1310	17	1 - 100	0 - 35
EM316FRM/S2	100Base-TX to 100Base-FX SM with IPLess Remote Management	Fast Ethernet/ Proprietary	RJ-45/DSC	1310	24	1 - 100	25 - 45
EM316FRM/S3	100Base-TX to 100Base-FX SM with IPLess Remote Management	Fast Ethernet/ Proprietary	RJ-45/DSC	1550	24	1 - 100	35 - 90

DUAL WAVELENGTH SINGLE FIBER (Sold in pairs only)

Ordering Information

Model	Function	Protocol Copper/Fiber	Connectors[1] Copper/Fiber	Tx / Rx Wavelength (nm)	Budget[2] (dB)	Range[3] (Copper) (m)	Range[3] (Fiber) (km)
EM316WFRMC/S2	100Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management	Fast Ethernet/ Proprietary	RJ-45/SC	1310/1550	17 (@1310 nm)	1 - 100	0 - 30
EM316WFRMT/S2				1550/1310			
EM316WFRMC/S3	100Base-TX Ethernet to 100Base-FX Single Fiber Bidirectional SM with IP-Less Remote Management	Fast Ethernet/ Proprietary	RJ-45/SC	1310/1550	22 (@1310 nm)	1 - 100	0 - 45
EM316WFRMT/S3				1550/1310			

[1] Default connectors listed, others optional.
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MRV has more than 50 offices throughout the world. Addresses, phone numbers and fax numbers are listed at www.mrv.com.
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